will not be left behind in the steps which are being taken to promote Physico-Astronomical observations; and I sincerely hope that our own Government will ere long adopt measures to ensure to England a fair chance of honourably competing in the advancement of that branch of Astronomical Science which the Fellows of this Society have done so much to promote mainly from their own individual resources.

On the State of the Reductions of their Observations of the Transit of Venus. By Lord Lindsay and Mr. Gill.

The observations accumulated during the Expedition are:

(1) Those connected with the geographical position of the station, Belmont, and the connection of that with neighbouring stations.

(2) Observations connected with the determination of the Solar Parallax by *Juno* and *Venus*, including the observations for ascertaining instrumental constants and corrections.

(3) Observations of a few objects of interest in the Southern Hemisphere, such as double stars; however, for this class we had but little leisure.

(4) The measurement of a base, and exact triangulation of the Great Pyramid of Gizeh.

As yet the reduction of this mass of observations has been confined chiefly to those that come under section (1). This section includes—First. Determinations of differences of longitude by interchange of telegraphic signals, and secondly, by transport of chronometers.

The determinations by telegraph are, between—

1. Belmont and Pamplemousse (Mr. Meldrum's Observatory).
2. Belmont and Solitude (the German Station).
3. Aden and Bombay (Chambers' Observatory).
4. Aden and Suez.
5. Suez and Alexandria.
6. Alexandria and Malta.
7. Malta and Berlin; and
8. Alexandria and Berlin direct.

We cannot sufficiently express our thanks to the various Telegraphic Companies for their excessive kindness and the liberal manner in which the lines were placed at our disposition over so great a length, or to the *employés* on those lines, who rendered all and most willing assistance and information.

The chronometrical determinations are, between—

1. Belmont and Pamplemousse Obs. 8 chron. } Double
2. Belmont and Solitude . . . 36 „ } runs.

3. Belmont and Mr. Neate's station in Rodrigues, 2 double runs.*

4. Belmont and Reunion . 1 run
5. Reunion and Seychelles. 1 „
6. Seychelles and Aden . 1 „
7. Mauritius and Aden . 1 „

} making Aden, Mauritius, 2 runs.

8. Aden and Suez, 2 runs, from 3 to 8, consisting of runs of 80 chronometers.

9. In Egypt. Mr. Gill's station, and Mr. Hunter's station, at Suez, 1 double run of 8 chronometers.

10. Helroan (Dr. Döllen's station) and Great Pyramid,
1 double run of 9 chronometers, and
1 „ „ 18 „

11. Suez to Greenwich, 2 runs, 50 chronometers.

12. Greenwich to Liverpool (Bidston Observatory). 2 runs, 50 chronometers.

During these runs the chronometers were compared *inter se* twice a day.

Where the stations have been well connected by telegraphic Exchanges the chronometer runs will be chiefly used as a control on their rates.

In all these determinations, almost the whole of the time observations have been reduced in duplicate; and from many of these being made in the vertical of a circumpolar (Döllen's method) the work has been one of considerable labour, though the great accuracy obtained fully compensates for this. The telegraphical exchanges are also reduced, so that the results of the telegraphic longitudes are nearly complete; in these interchanges nearly 10,000 signals have been sent.

The 50 chronometers employed were tested for nine weeks (some longer) at the Liverpool Observatory, one week at each of the following temperatures: 85°, 70°, 55°, 70°, 85°, 70°, 55°, 70°, and 85°, before the expedition, and after the return, one week each at 55°, 70°, 85°, 95°, 85°, 70°, and 55°.

An investigation has been made from the data furnished by these trials on the temperature co-efficients; and tables, showing the correction (Thermal) for every degree Fahrenheit, between 55° and 95°, have been constructed for each instrument separately.

This investigation has been one of great labour, and has been extended to many chronometers besides those used in the expedition, from data supplied by Mr. Hartnup, from the trials at the Liverpool Observatory; one peculiarly interesting and instructive case being that of a chronometer whose daily rate in various temperatures has been recorded without interruption for ten years.

We hope that the results of these investigations, coupled

* By a "double run" is meant the chronometers being sent and returning forthwith to the same place.

with much information collected by the makers, will help to extend the knowledge of the chronometer, its errors, and their causes.

The temperature has been found from day to day during the expedition by means of an uncompensated chronometer, whose rate is affected about 6 sec. a day for 1° Fahr., and the application of these corrections is now being proceeded with.

The observations for latitude with the altazimuth, and with the transit instrument, in the prime vertical, are reduced.

The reduction of the observations on *Juno*, with the heliometer, is delayed until the meridian observations of the stars of comparison are completed, till the zone of stars observed for absolute value of the scale, and temperature co-efficient, has been remeasured, and till the extension of the division errors up to 2° distance is finished, as well as a redetermination of the errors of the screw of the reading microscope.

All these determinations are being pushed on as rapidly as possible. The reduction of the *Venus* heliometer measures is also delayed for the same purpose.

A redetermination of the screw of Airy's D.I. micrometer, used on *Venus* by Dr. Copeland, will be concluded before the reduction of those observations.

The instrument for measuring the photographs of the Transit is now almost complete, and the investigation of the errors of its scales and microscopes will be undertaken as soon as it is erected.

The photographs have been found to bear a magnifying power of 10 diameters well; and some will bear 20 with advantage.

Dun Echt, 1875, *Nov.* 12.

On the Error of the Tabular Place of Venus during the Transit of December 8, 1874. By Colonel Tennant, R.E.

(*From a Letter to E. Dunkin, Esq., Honorary Secretary.*)

I have been waiting till I should have something definite to say about the error of the place of *Venus* during the Transit, though I have long seen that there must be some mistake in Mr. Hind's estimate of the accuracy of M. Le Verrier's Tables. I have now completed the reduction of the altazimuth observations with the following result:

Correction to (R.A. ♀) −(R.A. ⊙) = +4″·47 −0″·071 dL −0·989 $d\pi$

„ (N.P.D. ♀)−(N.P.D. ⊙) = +2″·24 −0″·017 dL −2·629 $d\pi$

The longitude has been assumed as $5^h\ 11^m\ 31^s{\cdot}00$ E. which turns out to be exactly what Mr. Pogson makes from signals we